
MultiModem® ZBA

MT9234ZBA-Series

MT9234ZBA
MT9234ZBA-V

User Guide



MultModem ZBA User Guide
Models: MT9234ZBA, MT9234ZBA-V
PN S000387, Version J

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Revisions

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E	06/23/2011	Removed references to product CDs.
F	10/05/2012	Corrected various typographical errors. Added current firmware identification and additional fax data rates.
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This device covered by one or more of the following patents: 6,031,867; 6,012,113; 6,009,082; 5,905,794; 5,864,560; 5,815,567; 5,815,503; 5,812,534; 5,809,068; 5,790,532; 5,764,628; 5,764,627; 5,754,589; 5,724,356; 5,673,268; 5,673,257; 5,644,594; 5,628,030; 5,619,508; 5,617,423; 5,600,649; 5,592,586; 5,577,041; 5,574,725; 5,559,793; 5,546,448; 5,546,395; 5,535,204; 5,500,859; 5,471,470; 5,463,616; 5,453,986; 5,452,289; 5,450,425; D353,598; 5,355,365; 5,309,562; 5,301,274; 7082106; 7082141; 7092406. Other Patents Pending.

World Headquarters

Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, Minnesota 55112
Phone: 763-785-3500 or 800-328-9717
Fax: 763-785-9874
Internet Address: <http://www.multitech.com>

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In order to better serve our customers, manage support requests and shorten resolution times, we have created the online web portal allowing you to submit questions regarding Multi-Tech products directly to our technical support team. Get answers to your most complex questions, ranging from implementation, troubleshooting, product configuration, firmware upgrades and much more. To create an account and submit a Support Case on the Portal, visit support.multitech.com

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Technical Support

Business Hours: M-F, 9am to 5pm CST

Country	By Email	By Phone
Europe, Middle East, Africa:	support@multitech.co.uk	+(44) 118 959 7774
U.S., Canada, all others:	support@multitech.com	(800) 972-2439 or (763) 717-5863

Warranty

To read the warranty statement for your product, please visit: <http://www.multitech.com/warranty.go>

Contents

Chapter 1 – Introduction	6
AT Commands Information.....	6
Technical Specifications	6
Chapter 2 – Installing the Modem	8
Before You Begin	8
Analog Telecom Safety Warnings	8
Changing the Internal Jumpers	9
Opening the Modem.....	9
Location of the Jumpers	9
Changing the Dial-Up/Leased-Line Jumper.....	10
Changing the Voice Jumper.....	10
Connecting the Modem to Your PC	10
Connecting the Modem to Your PC	11
Connecting the Modem to the Telephone Line	11
Connect the Two-Wire Leased Line (Leased Line Only).....	11
Connect the Modem to a Phone (Optional)	11
Connect a Microphone (Voice Option)	11
Connect Speakers (Voice Option).....	12
Connect the Modem to the AC Power Outlet	12
Power-On Test	12
Installing the Modem Driver.....	12
Downloading and Installing the Modem Driver.....	12
Configuring the Modem for Your Country or Region.....	13
Installing and Using the Global Wizard.....	13
Using AT Commands to Configure Your Modem.....	14
Chapter 3 – Operation	15
Front Panel Overview.....	15
Leased-Line Operation	15
Setup	15
Connecting to the Internet	16
Chapter 4 – Remote Configuration	17
Basic Procedure	17
Setup.....	17
Changing the Setup Password	17
Changing the Remote Escape Character	18
Chapter 5 – Callback Security	19
Changing the Setup Password.....	19

Turning Callback Security On and Off	19
Setting Callback Security Message Parity	20
Assigning Callback Passwords and Phone Numbers	20
Calling Procedures.....	21
Password-Only Callback.....	21
Number-Entry Callback.....	22
Extension-Entry Callback	22
Direct Connection	23
Callback Security Commands.....	24
Chapter 6 – Troubleshooting.....	25
None of the Indicators Light.....	25
The Modem Does Not Respond to Commands	25
The Modem Cannot Connect When Dialing	26
The Modem Disconnects While Online.....	27
Modem Cannot Connect When Answering	27
File Transfer Is Slower Than It Should Be.....	28
Data Is Being Lost	28
There Are Garbage Characters on the Monitor	28
The Modem Doesn't Work with Caller ID.....	29
Fax and Data Software Can't Run at the Same Time	29
Appendix A – Upgrading the Modem's Firmware	30
Identifying the Modem Firmware	30
Identifying the Current Firmware Version	30
Downloading the Upgrade File	30
Extracting the Upgrade Files	31
Clearing Your Stored Parameters.....	31
Upgrading the Modem's Firmware	31
Restoring Your Parameters	32
Appendix B – Regulatory Compliance	33
47 CFR Part 15 Regulation Class B Devices.....	33
FCC Part 68 Telecom	33
Canadian Limitations Notice	34
Industry Canada.....	35
EMC, Safety and R&TTE Directive Compliance	35
International Modem Restrictions	36
New Zealand Telecom Warning Notice	36
Russian Statement	37
South African Statement	37

Japan Requirements	37
Thailand Approval	37
Korea Class B Statement	37
Brazil Special Cable – for MT9234ZBA model only	38
China Requirements	38
Appendix C – Environmental Information	39
Waste Electrical and Electronic Equipment Statement	39
REACH Statement	40
Registration of Substances:	40
Substances of Very High Concern (SVHC)	40
Restriction of the Use of Hazardous Substances (RoHS)	41
Information on HS/TS Substances According to Chinese Standards	42
Information on HS/TS Substances According to Chinese Standards (in Chinese).....	43
依照中国标准的有毒有害物质信息	43
Appendix D – Installing a Modem under Linux	44
Standard Linux Serial Port Definitions	44
Installation	44
Setup.....	44
Using the Terminal Program Minicom to Verify Operation	44
Using the Modem to Call the Internet	45
Calling the ISP	45
Answering Calls.....	45
Appendix E – Using Out of Band Management.....	46
Configuring the Modem for your Country or Region	46
Configuring for Callback Security in Direct Connect Mode.....	46
Turning Direct Connect Callback Security On and Off.....	46
Setting the Parity of the Callback Security Messages.....	46
Assigning Callback Passwords.....	47
Calling a Modem Configured for Callback Security	47
Console Port Final Setup	48
Console Port Connections.....	48
Cable Pin-outs and Cabling Guide.....	48
Remote Configuration	49
Index	50

Chapter 1 – Introduction

The MultiModem® ZBA business modem supports remote configuration for centralized setup and control, as well as callback security making it the modem of choice for business applications. The V.92/56K models support out of band management, as well as increased upload speeds for quicker connect times, and V.34/33.6K fax and Error Correction Mode. In addition, the globally approved MultiModem ZBA business modems are approved for use in many countries around the world. This means one model can ship virtually anywhere.

AT Commands Information

The AT Commands, S-Registers, and Result Codes for the MT9234ZBA-Series Modems are published in a separate Reference Guide. You can download the guide from www.multitech.com.

Technical Specifications

The MT9234ZBA-Series modem meets the following specifications:

Trade Name	MultiModem® ZBA
Model Number	MT9234ZBA or MT9234ZBAV
Server-to-Client	56K speeds when accessing a V.90 or V.92 server
Client-to-Server	Up to 48Kbps when accessing a V.92 server
Client-to-Client Data Rates	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800 bps, 14400, 12000, 9600, 7200, 4800, 2400, 1200, 0-300 bps
Fax Data Rates	33600, 31200, 28800, 26400, 24000, 21600, 19200, 16800, 14400, 12000, 9600, 7200, 4800 and 2400
Voice Compatibility	TIA/EIA IS-101 (Voice Option only)
Data Format	Serial, binary, asynchronous
Modem Compatibility	ITU-T V.92, V.90, V.34 enhanced, V.34, V.32bis, V.32, V.22bis, V.22; Bell 212A and 103/113; ITU-T V.21 & V.23; V.42, V.42bis, V.44.
Fax Compatibility	ITU-T “Super” Group 3; Class 1.0, 2.0, 2.1; T.4; T.30; V.21; V.27ter; V.29; V.34; V.17; and TIA/EIA Class 1, 2; TR29.2
Video Compatibility	ITU-T V.80 for H.324 video conferencing
Error Correction	ITU-T V.42
Data Compression	ITU-T V.44 (6:1 throughput)
Speed Conversion	Serial port data rates adjustable to 300, 1200, 2400, 4800, 9600, 19,200, 38,400, 57,600, 115,200, and 230,400 bps
Mode of Operation	Fax online modes; full duplex over dial-up lines
Flow Control	XON/XOFF (software), RTS/CTS (hardware)
Intelligent Features	Plug and play; fully AT command compatible; dialing options, autoanswer; adaptive answer; EIA extended automode; adaptive line probing; automatic symbol and carrier frequency during start-up, retrain, and rate renegotiation; DTMF detection; call status display, auto-parity and data rate selections; keyboard-controlled modem options; non-volatile memory; remote configuration; DTR dialing; callback security; A-law support in 56K modes; 11-bit support; real-time fax compression conversion; U.S. Caller ID reporting; quick-connect startup (V.92).
Command Buffer	40 characters

Transmit Level	-12 dBm (Euro/NAM) – varies by country/region setting
Frequency Stability	±0.01%
Receiver Sensitivity	-43 dBm under worst-case conditions
AGC Dynamic Range	43 dB
Interface	TIA/EIA RS-232C/ITU-T V.24/V.28
Connectors	DB25F RS-232C connector; 2 RJ-11 telephone jacks; power jack
Cables	Country-specific telephone; power cables; serial cable. Note: Any cables connected to the computer should be shielded to reduce interference.
Diagnostics	Power-on self test, local analog loop, local digital loop, remote digital loop.
Indicators	LEDs for Transmit Data, Receive Data, Carrier Detect, Off Hook, Terminal Ready, Power.
Speaker	Internal speaker for call progress monitoring.
Operating Temperature	0°– 50° C (32°–120° F) ambient under closed conditions; humidity range 20–90% (non-condensing)
Power Requirements	Global modems: 100–240 VAC, 50/60 Hz universal power supply
Power Consumption	9 VDC, 300 mA maximum
Approvals	CE Mark EMC: FCC Part 15 Class B, EN55024, EN55022 Class B, ICES-003 Class B Safety: UL/cUL 60950-1, IEC 60950-1, AS/NZS 60950 Telecom: 47CFR Part 68, CS03, TBR21, other countries also included
Dimensions	10.8 cm wide x 14.8 cm long x 2.9 cm high (4.25" x 5.8" x 1.15")
Weight	224 g (8 oz)
Limited Warranty	2 years

Chapter 2 – Installing the Modem

Before You Begin

Before you install the modem, download the following from www.multitech.com/support.go:

- From the Drivers page, the driver for your model and operating system.
- From the Software page, the Global Wizard.

Analog Telecom Safety Warnings

Before servicing, disconnect this product from its power source and telephone network. Also:

- Never install telephone wiring during a lightning storm.
- Never install a telephone jack in wet locations unless the jack is specifically designed for wet locations.
- Use this product with UL and cUL listed computers only.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Avoid using a telephone during an electrical storm. There may be a remote risk of electrical shock from lightning.
- Do not use a telephone in the vicinity of a gas leak.

CAUTION: To reduce the risk of fire, use only 26 AWG or larger UL Listed or CSA Certified telecommunication line cord.

Avertissements de sécurité télécom analogique

Avant de l'entretien, débrancher ce produit de son réseau d'alimentation et de téléphone. également:

- Ne jamais installer du câblage téléphonique pendant un orage électrique.
- Ne jamais installer de prises téléphoniques à des endroits mouillés à moins que la prise ne soit conçue pour de tels emplacements.
- Utilisez ce produit avec UL et cUL ordinateurs répertoriés seulement.
- Ne jamais toucher fils ou des bornes téléphoniques non isolés à moins que la ligne téléphonique n'ait été déconnectée au niveau de l'interface réseau.
- Faire preuve de prudence au moment d'installer ou de modifier des lignes téléphoniques.
- Éviter d'utiliser le téléphone pendant un orage électrique. Il peut y avoir un risque de choc électrique causé par la foudre.
- N'utilisez pas un téléphone à proximité d'une fuite de gaz.

ATTENTION: Pour réduire les risques d'incendie, utiliser uniquement des conducteurs de télécommunications 26 AWG au de section supérieure.

Changing the Internal Jumpers

This step is required only if:

- You intend to use the modem on a leased line.
- You intend to add a monophonic external speaker to your modem with the voice option. No changes are needed for stereo.

This will require you to open the modem and move one or more jumpers on the modem's printed circuit board.

Warning: The following procedure must be performed by authorized service personnel.

Caution: The circuit board can be harmed by static electricity. Before you open the case, touch a grounded object, such as the metal chassis of your computer, to discharge any static electricity in your body, then touch the metal shell of the modem's RS-232 connector to ensure that there is no voltage difference between you and the modem.

Opening the Modem

1. If the modem is connected, turn it off and remove all connecting cables (including the power and line cables).
2. Turn the modem upside down.
3. On the bottom of the modem are two screws, which hold the case together. Remove both screws and set them aside.
4. Turn the modem right side up.

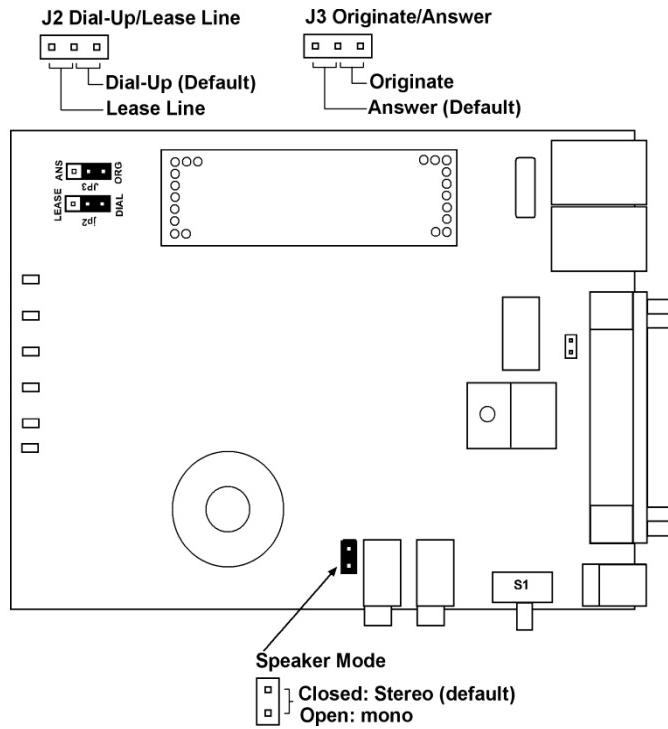


5. Before touching anything inside the modem case, discharge any static in your body by touching a piece of grounded metal such as the computer chassis. Electrostatic discharge (ESD) is the release of stored static electricity that can damage electrical circuitry or components. Static electricity is often stored in your body, and discharged when you come in contact with an object of a different potential.



6. Perform the procedure below described in this section only at an ESD workstation using an antistatic wrist strap. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal ground screw (lug).
7. Remove the top part of the modem case.

Location of the Jumpers



Note: The Speaker Mode jumper is for a modem with the voice option

Changing the Dial-Up/Leased-Line Jumper

As shipped from the factory, your modem is configured for normal dial-up operation. That is, the modem must dial a phone number to connect to another modem. To use the modem on a leased line, you must change jumper J2 to select leased line operation, and J3 to select whether it will be the originating or the answering modem. If dial-up operation is selected, J3 has no effect.

See Chapter 3 for additional leased line information.

- The factory default is the answer position. This makes the modem the answering modem on the leased line.
- To use the modem on a leased line, move the J2 jumper plug from the default dial-up position to the leased line position.
- To make the modem the originating modem on the leased line, move the J3 jumper plug to the originate position.

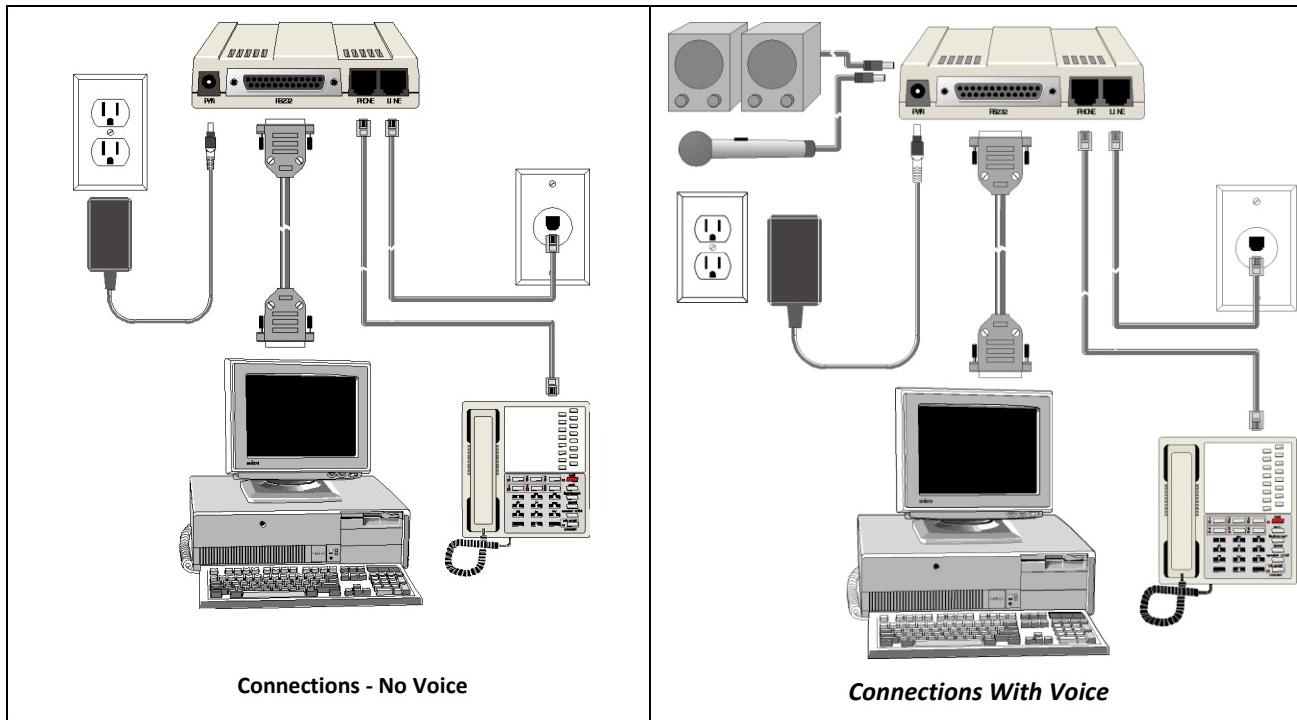
Changing the Voice Jumper

The speaker jumper is next to the external speaker jack.

- The factory default position of the voice jumper is set for a stereo speaker or sound card. A jumper plug covers both pins of the jumper.
- To use the modem with a monophonic external speaker, remove the jumper plug from the jumper pins. You can store it by placing it on one jumper pin.

Connecting the Modem to Your PC

Turn off your computer. Place the modem in a convenient location, and then connect it to your computer's serial port, the telephone line or leased line, AC power, and, optionally, your telephone.



Connecting the Modem to Your PC

Plug one end of the serial cable into the RS232 connector on the modem and the other end into a serial port connector on your computer, such as COM1 or COM2.

Connecting the Modem to the Telephone Line

Plug one end of the modular telephone cable into the modem's LINE jack and the other end into a standard phone wall jack.

Important: The LINE jack is not interchangeable with the PHONE jack. Do not plug the telephone into the LINE jack or the line cable into the PHONE jack.

Note: Regulatory agencies may impose certain restrictions on equipment connected to public telephone systems. For more information, see Appendix B.

Connect the Two-Wire Leased Line (Leased Line Only)

Plug one end of a two-wire telephone cable into the modem's LINE jack and the other end to a two-wire leased line wall jack or terminals.

Note: Before you can use the modem on a leased line, you must first change the internal jumpers. See "Step 2: Change the Internal Jumpers."

Connect the Modem to a Phone (Optional)

If you want to connect a phone to same line as the modem, plug it into the modem's PHONE jack.

Important: The PHONE jack is not interchangeable with the LINE jack. Do not plug the telephone into the LINE jack or the line cable into the PHONE jack.

Connect a Microphone (Voice Option)

For voice mail or speakerphone applications, plug an unamplified microphone into the MIC jack on the side of the modem. The microphone should have a stereo 1/8-inch mini plug. Do not use a monophonic microphone.

Connect Speakers (Voice Option)

For speakerphone or voice mail applications, use a 1/8-inch plug male-to-male stereo patch cord to connect the SPKR jack on the side of the modem to the LINE IN jack on your sound card. If your sound card does not have a LINE IN jack, use its MIC jack. The stereo male-to-male patch cord can be purchased at a local PC retail store.

If you do not have a sound card, you can plug an unamplified speaker directly into the SPKR jack.

Connect the Modem to the AC Power Outlet

The power switch is located on the right side of the modem. Make sure it is set to OFF.

Attach the appropriate interchangeable blade module to the power supply module. Connect the power lead from the power supply module into the PWR jack on the modem. Now, plug the power supply module into your power source.

Note: Use only the power supply supplied with the modem. Use of any other power supply voids the warranty and can damage the modem.

Power-On Test

Test the modem by turning it on. When you turn it on, the modem performs a diagnostic self-test and the power indicator should light. If this does not happen, check that the power switch is on, the power supply is solidly connected, and the AC outlet is live. If these measures do not work, refer to Chapter 6, “Troubleshooting”.

Installing the Modem Driver

If you use Windows 2000 or above, you must install the modem driver. The modem driver tells Windows how to control the modem. If you use a Linux operating system, please refer Appendix D. If you use another operating system, please refer to its documentation for modem installation information.

Downloading and Installing the Modem Driver

To download and install the modem driver:

1. From the Multi-Tech website, download the .zip file of the driver that is appropriate to your operating system.
2. Extract the contents of the zip file to the desired location.
3. Power down your computer.
4. Ensure the modem is connected to your computer and powered on.
5. Power up your computer.
 - a. The Found New Hardware wizard opens. Select the radio button **No, not at this time**. Click **Next**.
 - b. In the next wizard pane, select the radio button **Install from a list or specific location**. Click **Next**.
 - c. Select the radio button **Don't search, I will choose the driver to install**. Click **Next**.
 - d. Ensure the **Show compatible hardware** checkbox is checked.
 - e. From the **Models** group, select the desired, compatible model. Click **Next**.
 - f. Windows displays a warning message, indicating the driver you want to install has not passed Windows logo testing. This warning does not impact the operation of the driver. So click **Continue Anyway**.
 - g. While the driver is installed, a progress message appears in the wizard pane. When the driver is installed, the Found New Hardware wizard displays the **Finish** button. Click **Finish**.

-
6. If you are unable to access the modem after installation, turn the modem's power off, then back on. For some configurations, before the modem can communicate through the COM port, you need to turn the power off then back on.

Configuring the Modem for Your Country or Region

Different countries have different requirements for how modems must function. Therefore, before you use your modem, you must configure it to match the defaults of the country/region in which you are using it. You must also do this if you move the modem to another country/region after it has been configured for the first country/region. You can use one of two configuration methods:

- Use the Global Wizard to Configure Your Modem
- Use AT Commands to Configure Your Modem

Installing and Using the Global Wizard

This section describes how to install the Global Wizard program, and then how to use the Global Wizard program. The Global Wizard program helps you configure your modem's homologation parameters for the country in which you want to operate the modem.

If your computer is running the Windows 2000 operating system or newer, it is recommended that you use the Global Wizard program.

To install the Global Wizard program:

1. If you have not already done so, download the file **Global Wizard** from the Multi-Tech website.
2. From the location where you stored the download file, double click the global wizard icon.
3. In the dialog box that appears, click **Run**.
4. The Welcome pane of the Global Wizard Setup wizard appears. Click **Next**.
5. A License Agreement wizard pane opens. If you accept the agreement, click **Yes**.
6. In the next pane of the wizard, select the location where you want to install Global Wizard. If desired, navigate to the location where you want to install. Otherwise, maintain the default location. Click **Next**.
7. The installation proceeds, and then completes.
 - Select the **Yes, I want to restart my computer now** radio button.
 - At the InstallShield Wizard Complete pane, click **Finish**.
8. After the computer reboots, you can use the Global Wizard to configure your modem's homologation parameters.

To use the Global Wizard program:

1. From the Windows **Start** button, select **All Programs**, the **Global Wizard** folder and **GlobalWizard**.
2. The first pane of the Global Wizard opens. Click **Next**.
3. In the next wizard pane, select port associated with the modem that you want to configure. Click **Next**.
4. A notification dialog box opens. Read this information, then click **OK**.
5. In the next wizard pane, from the Country/Region drop-down list, select the country/region in which the modem will be used. Click **Next**.
6. In the next wizard pane, review your country/region choice. If it is correct, click **Next**.
7. When Global Wizard announces that the parameters have been set, click **Finish** to exit.

Using AT Commands to Configure Your Modem

Non-Windows users can configure the modem using AT commands. You must enter these commands in your communication program's terminal window.

1. Run your favorite communication program and open the program's terminal window.
2. To configure the modem for a specific country/region, type **AT%T19,0,nn**,
where **nn** is the country/region code in hexadecimal notation.
3. Click Enter. The message **OK** displays.
4. To verify that the correct country/region has been configured, type **ATI9**
5. Click Enter.

The country/region code displays:

Example:

Country/Region	AT Command (hexadecimal)	Country code (decimal)
Euro/NAM	AT%T19,0,34 (default)	52

A list of country/region codes can be found on the Multi-Tech Web site at:

http://www.multitech.com/en_US/PRODUCTS/Categories/Device_Networking/global_modems/configuration.asp

The Global Modem Country Approvals page displays. On this page you can view approvals, configuration strings and responses by country and products.

Chapter 3 – Operation

Front Panel Overview



The LED indicators on the front panel indicate status, configuration, and activity:

TD – Transmit Data. Flashes when the modem is transmitting data to another modem.

RD – Receive Data. Flashes when the modem is receiving data.

CD – Carrier Detect. Lights when the modem detects a valid carrier signal from another modem. It is on when the modem is communicating with the other modem, and off when the link is broken.

OH – Off-Hook. Lights when the modem is off-hook, which occurs when the modem is dialing, online, or answering a call. Flashes when the modem pulse-dials.

TR – Terminal Ready. Lights when a communications program is using the modem. It means the modem is ready for an outgoing or incoming call. It goes off when the communications program disconnects the serial port. When it goes off, a connected modem will also disconnect.

Power – The Power led lights when the system is applying power to the modem.

Leased-Line Operation

The MultiModem ZBA modem can be used on a two-wire leased line.

A leased line is a private, permanent telephone connection between two points. Unlike normal dialup connections, a leased line is always active. The modems automatically connect when they are attached to the line and are turned on. Because a leased line is always active, one of the two modems on the line must be configured as the *originate* modem and the other as the *answer* modem. It does not matter which is which.

In the event of an interruption, leased-line modems automatically reconnect when the data line or power is restored.

Setup

1. Open the modem and change jumper J2 to select leased-line operation, and jumper J3 to select either originate or answer operation, depending upon how you intend to use the modem. See Chapter 2 for the detailed procedure.
2. Connect a modular telephone cable to the LINE jack. Connect the other end of the cable to a two-wire lease-line jack or terminals supplied by the telephone company.
3. Turn on the modem.

Connecting to the Internet

Your Multi-Tech modem is your gateway to the Internet and the World Wide Web. To access the Internet and Web via your modem, you must establish a dial-up account with an Internet service provider (ISP). To locate an ISP near you, look in a local directory or computer publication. Your ISP should provide you with the following information

- User name (also called user ID)
- Password
- Access number (the number you call to connect to the server)
- Host name and/or domain name
- Domain Name Server (DNS) server address

If, besides the Web, you use the Internet for e-mail and newsgroups, your ISP should also provide you with the following information:

- E-mail or POP mail address
- POP server address
- Mail or SMTP address
- News or NNT server address

Chapter 4 – Remote Configuration

Remote configuration is a network management tool that allows you to configure MultiModem ZBA units anywhere in your network from one location. With password-protected remote configuration, you can issue **AT** commands to a remote modem for maintenance or troubleshooting as if you were on site.

Basic Procedure

The following steps can be used when the connection is established by the **local** or the **remote** modem.

Note: The remote computer must be running and a communication program must be ready for a data connection, which will be indicated by a lighted **TR** indicator on the front of the modem.

1. Establish a data connection with a remote MultiModem ZBA modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password, and press Enter. Example: **%%%ATMTSMODEM**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem responds with **OK**.
3. You can now send **AT** commands to configure the remote modem.
4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0** and pressing Enter.
5. Type **A TO** and press Enter to exit remote configuration. You can now break the connection in the normal way.

Setup

Multi-Tech modems are shipped with a default setup password (MTSMODEM). Because anyone who has the *User Guide* knows the default setup password, you should change the password and possibly also the remote configuration escape character.

Changing the Setup Password

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Sxxxxxxxx** if you have replaced the MTSMODEM password with xxxxxxxx) and press Enter. The modem responds with **OK** if the setup password is correct, and **ERROR** if it is wrong.
3. To change the password, type **AT#S=xxxxxxxx**, where xxxxxxxx stands for the password, and then press Enter. The password can include any keyboard character, and can be up to eight characters long. The modem responds with **OK**.

Caution: Passwords are case-sensitive. The next time you enter the password, it must be in the same case as you set it up.

4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you wish to set up the modem, you must use the new password.

Changing the Remote Escape Character

To further improve security, you can change a remote modem's remote configuration escape character either locally or remotely. The remote configuration escape character is stored in register **S9**. The factory default is 37, which is the ASCII code for the percent character (%). Setting **S9** to 0 (zero) disables remote configuration entirely.

Caution: If you do this remotely, you won't be able to change it back remotely.

1. Establish a remote configuration link with the remote modem as described in Basic Procedure.
2. Type **ATS9=n**, where *n* is the ASCII code for the new remote configuration escape character, and press Enter.
3. Save the new value by typing **AT&W** and pressing Enter.
4. Type **ATO** and press Enter to exit remote configuration.

Chapter 5 – Callback Security

This chapter describes how to use callback security with your modem. Callback security protects your network from unauthorized access and helps control long-distance costs. When callback security is enabled, all callers are requested to enter a password. If a valid password is received, the modem hangs up and returns the call by dialing a phone number that is stored with the password. The person being called back must then enter the password a second time to establish a connection.

Up to 30 callback passwords and dialing strings can be stored in the modem. Each dialing string can be up to 34 or 35 characters long and can contain commands as well as phone numbers. For mobile callers, the dialing string can be programmed to allow the caller to bypass the stored callback number by entering a temporary callback number, to enter an extension at the callback number, or to make a direct connection without callback.

For local security, the passwords and dialing strings that are stored in the modem are protected from tampering by a setup password, which you should change when you set up the modem. You can further protect the modem against tampering by disabling its ability to respond to most AT commands. To check for attempted break-ins, you can request the modem to display the number of failed password attempts.

Your modem was shipped with a default setup password (MTSMODEM). The same password is used for both callback security and remote configuration (Chapter 4). Because anyone who has access to this guide has access to the default password, you should change the password during your initial setup.

Changing the Setup Password

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#SMTSMODEM** (or **AT#Sxxxxxxxx** if you have replaced the MTSMODEM password with xxxxxxxx). Press Enter. The modem responds with *OK* if the setup password is correct and *ERROR* if it is wrong.
3. To change the password, type **AT#S=xxxxxxxx**, where xxxxxxxx stands for the password, and then press Enter. The password can include any keyboard character, and can be up to eight characters long. The modem responds with *OK*.
4. The new password is saved automatically. You can now either enter more AT commands or exit the data communications program. The next time you wish to set up the modem, you must use the new password.

Note: Passwords are case-sensitive.

Turning Callback Security On and Off

Callback security must be turned on to enter many callback security commands.

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#Sxxxxxxxx**, where xxxxxxxx is your password. Press Enter. The modem responds with *OK* if the setup password is correct and *ERROR* if it is wrong.

3. Type one of the following commands:

- **To turn off callback security:** Type **AT#CBS0** and press Enter. Callers no longer need a password to connect to the modem, the modem is unable to call them back, and the stored dialing command locations 0–3 become available.
- **To turn on both local and remote callback security:** Type **AT#CBS1**. Press Enter. With local security turned on, you must enter the setup password before you can enter any AT command except the **AT**, **ATIn**, and **AT#Sxxxxxxxx** commands. For a description of **remote** callback security, see the following paragraph.
- **To turn on remote callback security only:** Type **AT#CBS2** and press Enter. With remote callback security turned on, each caller is asked to enter a password, is called back, and then is asked to enter the password again before a connection can be made. Also, dialing command locations 0–3 for use with the **DS=y** dialing command are replaced by callback dialing command locations 0–29.
- **To temporarily disable callback security if the modem is set to #CBS1 or #CBS2 (for instance, to call another modem):** Type **AT#CBS3** and press Enter. The modem returns to its original setting when you issue the hangup command (**+++ATH**) or the modem is reset. Note that if a remote modem breaks the connection, callback security remains disabled.

Setting Callback Security Message Parity

The modem’s password prompt and messages parity must match the parity of the computer to which the modem is connected.

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#Sxxxxxxxx**, where **xxxxxxxx** is your password. Press Enter. The modem responds with *OK* if the setup password is correct and *ERROR* if it is wrong.
3. The modem’s parity default value is **No** parity (**AT#CBP0**). To change the modem’s default to use even parity, type **AT#CBP2**. Press Enter. For odd parity, type **AT#CBP1**. Press Enter.
4. To store the new parity value, type **AT&W**. Press Enter.

Assigning Callback Passwords and Phone Numbers

1. Open a data communications program such as HyperTerminal.
2. In the terminal window, type **AT#Sxxxxxxxx**, where **xxxxxxxx** is your password. Press Enter. The modem responds with *OK* if the setup password is correct and *ERROR* if it is wrong.
3. Enable callback security by typing **AT#CBS1** or **AT#CBS2** and pressing Enter.
4. To store a callback password for the first callback memory location, type **AT#CBN0=xxxxxxxx**, where **xxxxxxxx** is the first password. Press Enter. The password must be unique, must be six to eight characters in length, and must not contain a + or - character.
5. To store a callback password for the second callback memory location, type **AT#CBN1=xxxxxxxx**, where **xxxxxxxx** is the second password. Press Enter. Note that the memory location number in the command is incremented by one.
6. Repeat as many times as necessary, up to memory location 29, until all passwords are entered.

7. To store a callback phone number in the first memory location, type **AT&Z0=[+][-]ATxxxxxxxx[,???**, where xxxxxxxx is the dialing string. Press Enter. The phone number must be preceded by **DT** for tone dialing or **DP** for pulse dialing. The dialing string can also include other AT commands.

Example: **AT&Z0=+-ATM0DT5551212**. Up to 35 characters can be used. The +, -, and ??? characters are optional:

 - + Number entry. Enables a mobile caller to enter his current phone number for callback.
 - Direct connection. Enables a caller to choose direct connection without being called back.
 - ,??? Extension entry. Must be used with the + command. Enables a caller to enter an extension number for callback. The number of ? characters must equal the number of digits in the extension.
8. To store a callback phone number in the second memory location, type **AT&Z1=[+][-]ATxxxxxxxx[,???**, where xxxxxxxx is the dialing string, and press Enter. Note that the memory location number in the command is incremented by one.
9. Repeat, through memory location 29, until all dialing strings are entered.
10. To review your entries, type **AT&V** and press Enter.

Note: A form is provided on the last page of this chapter to help you plan or keep track of password and phone number assignments.

Calling Procedures

Use the following procedures to call a modem that has callback security enabled. Note that Autoanswer must be enabled on the calling modem (**\$0=1**).

Password-Only Callback

Use this procedure when calling from a fixed location.

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:
Password>
3. Type the password corresponding to the phone number for your modem. Press Enter. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears, and the modems disconnect:

OK Disconnecting

5. After the delay specified by the **#CBDn** command, the callback modem calls the number associated with the password. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBA{n** command.
6. After the modems reconnect, the following message reappears:

Password>

7. Type the same password that you used to initiate the call. You are allowed three attempts to enter the password, after which you will be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection:

OK Connecting

Number-Entry Callback

Mobile callers should use this procedure when calling from a phone number different from that stored with the password. The password that is used must be set up for optional number-entry callback.

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:

Password>

3. Type a number-entry password, press the plus key (+), type **ATDT** and the number to call back to, and press Enter. You have three attempts or one minute to enter a valid password.

Note: When you type your phone number, be sure to include the long distance and area codes if they are needed.

4. If the password is valid, the following message appears, and the modems disconnect:

OK Disconnecting

5. After the delay specified by the **#CBDn** command, the callback modem calls the number that you entered after the + character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBA_n** command.
6. After the modems reconnect, the following message reappears:

Password>

7. Type the same password that you used to initiate the call. You are allowed three attempts to enter the password, after which you will be disconnected.
8. If the password is valid, the following message appears and the modems establish a working connection:

OK Connecting

Extension-Entry Callback

Use this procedure when calling from an extension at the callback number. The password that you use must be set up for an optional extension-entry callback.

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:

Password>

3. Type an extension-entry password, press the plus key (+), type the extension to call back to, and press Enter. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears, and the modems disconnect:

OK Disconnecting

5. After the delay specified by the **#CBDn** command, the callback modem calls the extension that you entered after the + character. If the callback modem is unable to establish a connection, it tries again, up to the number of attempts specified by the **#CBA_n** command.
6. After the modems reconnect, the following message reappears:

Password>

7. Type the same password you used to initiate the call. You are allowed three attempts to enter the password. After that, you will be disconnected.

8. If the password is valid, the following message appears, and the modems establish a working connection:

OK Connecting

Direct Connection

Use this procedure when you want to connect without first being called back. The password that you use must be set up for an optional direct connection.

1. Using a data communications program such as HyperTerminal, dial the number of the callback modem.
2. When the connection is established, the callback modem responds with the following message:

Password>

3. Type a direct connection password, press the - key, and then press Enter. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the following message appears and the modems establish a working connection:

OK Connecting

Note: You can make all calls direct connect regardless of whether the password or phone number has the - character by using the **%H1** command.

Callback Security Commands

The AT Commands related to Callback Security are included in the AT Commands Reference guide. You can download this guide from the Multi-Tech website.

Callback Assignments Form

Location	Password	Telephone Number
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
34		
25		
26		
27		
28		
29		

Chapter 6 – Troubleshooting

Your modem was thoroughly tested at the factory before it was shipped. If you are unable to make a successful connection, or if you experience data loss or garbled characters during your connection, it is possible that the modem is defective. However, it is more likely that the source of your problem lies elsewhere. The following symptoms are typical of problems you might encounter:

- None of the LEDs light when the modem is on.
- The modem does not respond to commands.
- The modem cannot connect when dialing.
- The modem disconnects while online.
- The modem cannot connect when answering.
- File transfer is slower than it should be.
- Data is being lost.
- There are garbage characters on the monitor.
- The modem doesn't work with Caller ID.
- Fax and data software can't run at the same time.

None of the Indicators Light

When you turn on the modem, the LED indicators on the front panel should flash briefly as the modem runs a self-test. If the LEDs remain off, the modem is probably not receiving power.

- Make sure the modem's power switch is on, especially if you normally turn the modem on by turning on a power strip.
- If the modem is plugged into a power strip, make sure the power strip is plugged in and its power switch is on.
- Make sure the power supply is firmly connected to the modem and the power supply's power cord is firmly connected to both the power supply and the wall outlet or power strip.
- If the power strip is on and the modem switch is on, try moving the power supply to another outlet on the power strip.
- Test that the outlet is live by plugging another device, such as a lamp, into it.
- The modem or power supply may be defective. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem or power supply might be defective.

Caution: Do not under any circumstances replace the power supply with one designed for another product; doing so can damage the modem and void your warranty.

The Modem Does Not Respond to Commands

- Make sure the modem is plugged in and turned on. (See "None of the Indicators Light.")
- Make sure you are issuing the modem commands from data communication software, either manually in terminal mode or automatically by configuring the software. (You cannot send commands to the modem from the DOS prompt.)

- Make sure you are in terminal mode in your data communication program, then type **AT** and press Enter. If you get an *OK* response from your modem, your connections are good and the problem likely is in the connection setup in your communication software.
- If you don't get an *OK*, the problem may still be in the communication software. Make sure you have done whatever is necessary in your software to make a port connection. Not all communication programs connect to the COM port automatically. Some connect when the software loads and remain connected until the program terminates. Others can disconnect without exiting the program. The modem's TR indicator lights to show that the software has taken control of the modem through the COM port.
- Your communication software settings may not match the physical port to which the modem is connected. The serial cable might be plugged into the wrong connector—check your computer documentation to make sure. Or you might have selected a COM port in your software other than the one the modem is physically connected to—compare the settings in your software to the physical connection.
- If the modem is on, the cable is plugged into the correct port, the communication software is configured correctly, and you still don't get an *OK*, the fault might be in the serial cable. Make sure it is firmly connected at both ends.
- Is this the first time you have used the cable? If so, it may not be wired correctly. Check the cable description on the packaging to make sure the cable is the right one for your computer.
- Peripheral expansion cards, such as sound and game cards, might include a serial port preconfigured as COM1 or COM2. The extra serial port, or the card itself, may use the same COM port, memory address, or interrupt request (IRQ) as your communication port. Be sure to disable any unused ports.
- The serial port might be defective. If you have another serial port, install the modem on it, change the COM port setting in your software, and try again.
- The modem might have a problem beyond the scope of this user guide. If you have another Multi-Tech modem, try swapping modems. If the problem goes away, the first modem is possibly defective.

The Modem Cannot Connect When Dialing

There can be several reasons the modem fails to make a connection. Possibilities include

- lack of a physical connection to the telephone line.
- a wrong dial tone.
- a busy signal.
- a wrong number.
- no modem at the other end.
- a faulty modem, computer, or software at the other end.
- incompatibility between modems
- poor line conditions.

You can narrow the list of possibilities by using extended result codes. Extended result codes are enabled by default. If they have been disabled, include **V1X4** in the modem's initialization string, or in terminal mode enter **ATV1X4** and press Enter. When you dial again, the modem reports the call's progress.

- If the modem reports *NO DIALTONE*, check that the modem's telephone line cable is connected to both the modem's LINE jack (not the PHONE jack) and the telephone wall jack. If the cable looks secure, try replacing it. If that doesn't work, the problem might be in your building's telephone installation. To test the building installation, plug a telephone into your modem's telephone wall jack and listen for a dial tone. If you hear a dial tone, your modem might be installed behind a corporate phone system (PBX) with an internal dial tone that sounds different from the normal dial tone. In that case, the modem might not recognize the dial tone

and might treat it as an error. Check your PBX manual to see if you can change the internal dial tone. If you can't, change your modem's initialization string to replace **X4** with **X3**, which will cause the modem to ignore dial tones.

- If the modem reports **BUSY**, the other number might be busy, in which case you should try again later. However, it might indicate that you have failed to add a **9**, the prefix to the phone number if you must dial 9 for an outside line.

If you must dial 9 to get an outside line, the easiest way to dial it automatically is to include it in the modem's dial prefix; e.g., **ATDT9**. Note the comma, which inserts a pause before the number is dialed. By inserting **9**, into the dial prefix, you do not have to include it in each directory entry.

To change the dial prefix in Windows HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, and type **9** in the local and long distance boxes in **How I dial from this location**.

- If the modem reports **NO ANSWER**, the other system has failed to go off-hook, or you might have dialed a wrong number. Check the number.
- If the modem reports **NO CARRIER**, the phone was answered at the other end, but no connection was made. You might have dialed a wrong number, and a person answered instead of a computer, or you might have dialed the correct number but the other computer or software was turned off or faulty. Check the number and try again, or try calling another system to make sure your modem is working. Also, try calling the number on your telephone. If you hear harsh sounds, then another modem is answering the call, and the modems might be having problems negotiating because of modem incompatibilities or line noise. Try connecting at a lower speed.
- Poor line conditions can affect the connection. When using V.34 or V.32 client-to-client connections in poor conditions, setting **S38=0** may result in better performance.

The Modem Disconnects While Online

- If you are not using Modem on Hold, Call Waiting can interrupt your connection when someone tries to call you. If you have Call Waiting service, disable it before each call. In most telephone areas in North America, you can disable Call Waiting by preceding the telephone number with ***70** (but first check with your local telephone company).

You can automatically disable Call Waiting by including the disabling code in the modem's dial prefix (e.g., **ATDT*70**, – note the comma, which inserts a pause before the number is dialed). To change the dial prefix in Windows 98 HyperTerminal, select **Connect** from the **Call** menu, click **Dialing Properties**, check **This location has Call Waiting**, and select the correct code for your phone service.

If you have extension phones on the same line as your modem, you or someone else can interrupt the connection by picking up another phone. If this is a frequent problem, disconnect the extension phones before using the modem, or install another phone line especially for the modem.

- Check for loose connections between the modem and the computer, the telephone jack, and AC power.
- You might have had a poor connection because of line conditions or the problem might have originated on the other end of the line. Try again.
- Your ISP might have hung up on you because of lack of activity on your part or because you exceeded your time limit for the day. Try again.

Modem Cannot Connect When Answering

- The default DTR Control command (**&D2**) inhibits autoanswer. To enable autoanswer, change DTR Control to **&D0**, and make sure **&Q0**, **&Q5**, or **&Q6** is also set. For more information, see the **&D** command in the AT

Commands Reference Guide. For information on changing the modem's default configuration, refer to the **&D** command in the AT Commands Reference Guide.

- Autoanswer might be disabled. Turn on autoanswer in your communications program or send the command **ATSO=1 (ATSO=2 if you have Caller ID service)** to your modem in terminal mode.

File Transfer Is Slower Than It Should Be

- If you are using a slow transfer protocol, such as Xmodem, try Zmodem or Ymodem/G instead.
- Is your line noisy? If there is static on your line, the modem has to resend many blocks of data to insure accuracy. You must have a clean line for maximum speed.
- Are you downloading a compressed file with MNP 5 hardware compression enabled? Since hardware data compression cannot compress a file already compressed by an archiving program, the transfer can be marginally slower with data compression enabled than with it disabled.
- Does your Internet service provider (ISP) use the same 56K protocol as your modem? The default setting of your modem is to connect using either the V.92 or the V.90 protocol, depending on which one the ISP's modem is using. If your ISP uses the V.90 protocol, the maximum speed you will be able to upload at is 33,600 bps. Check with your ISP to see which protocols it supports.
- Are you trying to send a file to another client modem? If so, then your maximum possible connect speed is 33,600 bps. You can upload at speeds up to 48,000 bps only when connected to an ISP that supports the V.92 protocol.
- Try entering the **I11** command in online mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

Data Is Being Lost

- If you are using data compression and a high speed serial port, set the serial port baud rate to two to six times the data rate.
- Make sure the flow control method you selected in software matches the method selected in the modem.
- Try entering the **I11** command in online mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

There Are Garbage Characters on the Monitor

- Your computer and the remote computer might be set to different word lengths, stop bits, or parities. If you have connected at 8-N-1, try changing to 7-E-1, or vice-versa, using your communication software.
- You might be experiencing line noise. Enable error correction, if it is disabled, or hang up and call again; you might get a better connection the second time.
- At speeds above 2400 bps, the remote modem might not use the same transmission or error correction standards as your modem. Try connecting at a slower speed or disabling error correction. (With no error correction, however, line noise can cause garbage characters.)
- Try entering the **I11** command in online mode or the **&V** command in command mode to display information about the last connection, making a screen print of the connection statistics, and checking for parameters that might be unacceptable.

The Modem Doesn't Work with Caller ID

- Caller ID information is transmitted between the first and second rings, so if autoanswer is turned off (**S0=0**) or if the modem is set to answer after only one ring (**S0=1**), the modem will not receive Caller ID information. Check your initialization string, and if necessary change it to set the modem to answer after the second ring (**S0=2**).
- Make sure that you have Caller ID service from your telephone company.

Fax and Data Software Can't Run at the Same Time

- Communication devices can be accessed by only one application at a time. In Windows 2000 and higher, you can have data and fax communication applications open at the same time, but they cannot use the same modem at the same time.

Appendix A – Upgrading the Modem’s Firmware

Your modem is controlled by firmware, which is stored in flash memory. Firmware is nonvolatile; it remains stored in memory when the modem is turned off. However, it can be changed by either the manufacturer or the user as bugs are fixed or new features are added.

Since the firmware in your modem is stored in flash memory, you can upgrade it yourself in a few minutes by using the following procedures.

Identifying the Modem Firmware

You must know the model number and firmware version of your Multi-Tech modem to know whether or not you should update it.

1. Run your favorite terminal program. If you are using Windows 95 or above, you can use Windows HyperTerminal.
2. In the program’s terminal window, type **AT&F**. Even if you cannot see the **AT&F** command on your screen, be sure to type it completely, and then press Enter. If the modem does not respond with *OK*, repeat the **AT&F** command.
3. Now type **ATI**, press Enter, and record your results. The model number and firmware version should appear similar to that shown below.

Agere OCM V.92 MT9234ZBAV Serial Data/Fax/Voice Modem Version 1.02i

Identifying the Current Firmware Version

Identify the current version of the firmware at the Multi-Tech Web site. If your modem already has the current firmware, there is no need to update it.

1. Using your favorite Web browser, go to http://www.multitech.com/en_US/SUPPORT/Updates/Firmware/.
2. Scroll down to your modem model number.
3. Look at the firmware version number for your modem.
4. If the firmware version number matches the firmware version number found in “Identifying the Modem Firmware” you have the current firmware version and do not need to be updated.
5. If the firmware version number is greater than the firmware version number found in “Identifying the Modem Firmware” your modem has an older firmware version. Continue with “Downloading the Upgrade File.”

Warning: The first digit of the new firmware must match the first digit of the old firmware, or the modem may not work properly; e.g., if your current firmware version is 4.16, replace it only with 4.xx firmware, not 6.xx firmware.

Downloading the Upgrade File

1. If you are not already at the MultiModem ZBA Firmware page of the Multi-Tech Web site, follow the procedure in “Identifying the Current Firmware Version.”
2. Download the upgrade file for your modem by clicking its name, and save the file in a temporary folder on your hard disk.
3. In the same section of the Web page, click the Flash Wizard utility for your operating system to download it, and save it in the same folder.

Extracting the Upgrade Files

1. Install the Flash Wizard utility by double-clicking the file name in Windows Explorer.
2. Extract the upgrade files by double-clicking the file name. The extracted files include a .HEX file, which contains the upgrade data, and a Readme file.
3. Copy the upgrade .HEX file into the Flash Wizard folder, which, in a default installation, is at C:\Program Files\MultiTech Systems\Flash Wizard\.

Clearing Your Stored Parameters

Before you clear your modem’s flash memory, record the parameters that are currently stored so you can reprogram it after flashing. After you have recorded them, send the **AT&W1Z** command to the modem to clear the stored parameters.

4. Run your favorite terminal program.
5. In the program’s terminal window, type **AT&V** and press Enter to list your modem’s current parameters.
6. Record your parameters by saving the screens and sending them to your printer.
7. Type **AT&W1Z** and press Enter to clear your stored parameters and reset your modem to factory default.
8. Close the terminal program.

Upgrading the Modem’s Firmware

Before you begin the following procedure, read the README.TXT file extracted from the upgrade archive file. Note the file name for the new firmware (example: ARQG125A.HEX).

Warning: Never install an older version of firmware over a newer version. Doing this WILL DESTROY THE FLASH PROM! If the flash PROM is destroyed, the modem must be sent in for repair.

1. Run Flash Wizard by double-clicking its icon or file name, or by selecting it from the Start menu. The **Identifying Devices** dialog box is displayed as Flash Wizard locates and identifies the devices connected to your system.

Note: If the message *ERROR: No valid devices detected* is displayed, verify that the modem is turned on and that all cables are correctly and securely attached. Verify that the terminal application or software application is turned off.

2. Click the modem to be upgraded, and then click **Next** to proceed.
 3. Select the port to be upgraded from the **Port** list, select the appropriate .HEX file from the **Hex File** list, and then click **Next** to continue.
- Note:** Do not use FLASHLDR.HEX. This file is used internally by Flash Wizard.
4. The **Progress** dialog box appears, showing a status bar that indicates the progress of the upgrade.

- Caution:** Any disruption of the program during this stage of the upgrade can cause your modem to become inoperable. Wait for the **Next** button to become active before proceeding.
5. When the flash upgrade is complete, the message *Programming Complete* appears. Click **Next** to continue.
 6. The **Results** dialog box appears next. Click **Finish** to exit Flash Wizard.

Restoring Your Parameters

Your modem has been updated. You can now open your terminal program to reprogram your modem parameters or to confirm the update by typing **ATI** in the terminal window and pressing Enter.

Appendix B – Regulatory Compliance

47 CFR Part 15 Regulation Class B Devices

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Warning: Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC Part 68 Telecom

1. This equipment complies with Part 68 of the 47 CFR rules and the requirements adopted by the ACTA. Located on this equipment is a label that contains, among other information, the registration number and Ringer Equivalence Number (REN) for this equipment or a product identifier in the format:

For current products: US:AAAEQ##Txxxx.

For legacy products: AU7USA-xxxxx-xx-x.

If requested, this number must be provided to the telephone company.

2. A plug and jack used to connect this equipment to the premises wiring and telephone network must comply with the applicable 47 CFR Part 68 rules and requirements adopted by the ACTA. It's designed to be connected to a compatible modular jack that is also compliant.
3. The Ringer Equivalence Number (REN) is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. For products approved after July 23, 2001, the REN for this product is part of the product identifier that has the format US:AAAEQ##Txxxx. The digits represented by ## are the REN without a decimal point (e.g., 03 is a REN of 0.3). For earlier products, the REN is separately shown on the label.
4. If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

5. The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens, the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.
6. If trouble is experienced with this equipment, please contact Multi-Tech Systems, Inc. at the address shown below for details of how to have the repairs made. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.
7. Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.
8. No repairs are to be made by you. Repairs are to be made only by Multi-Tech Systems or its licensees. Unauthorized repairs void registration and warranty.
9. If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this equipment does not disable your alarm equipment.
If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.
10. Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.
11. This equipment is hearing aid compatible.
12. Manufacturing Information on telecommunications device (modem):

Manufacturer: Multi-Tech Systems, Inc.
Trade Name: MultiModem® ZBA
Model Number: MT9234ZBA
Registration No: US:AU7MM01BMT9234SMI
Ringer Equivalence: 0.1B
Modular Jack (USOC): RJ11C
Service Center in USA: Multi-Tech Systems, Inc.
2205 Woodale Drive
Mounds View, MN 55112 USA
(763) 785-3500
(763) 785-9874 Fax

Canadian Limitations Notice

Notice: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment.

Notice: The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five.

Restrictions concernant le raccordement de matériel

Avis: Le présent matériel est conforme aux spécifications techniques d'Industrie Canada applicables au matériel terminal. Cette conformité est confirmée par le numéro d'enregistrement. Le sigle IC, placé devant le numéro d'enregistrement, signifie que l'enregistrement s'est effectué conformément à une déclaration de conformité et

indique que les spécifications techniques d'Industrie Canada ont été respectées. Il n'implique pas qu'Industrie Canada a approuvé le matériel.

Avis: L'IES assigné à chaque dispositif terminal indique le nombre maximal de terminaux qui peuvent être raccordés à une interface téléphonique. La terminaison d'une interface peut consister en une combinaison quelconque de dispositifs, à la seule condition que la somme d'indices d'équivalence de la sonnerie de tous les dispositifs n'excède pas 5.

Industry Canada

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement Canadien sur le matériel brouilleur.

This device complies with Industry Canada RSS Appliance radio exempt from licensing. The operation is permitted for the following two conditions:

1. the device may not cause harmful interference, and
2. the user of the device must accept any interference suffered, even if the interference is likely to jeopardize the operation.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

1. l'appareil ne doit pas produire de brouillage, et
2. l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

EMC, Safety and R&TTE Directive Compliance



The CE mark is affixed to this product to confirm compliance with the following European Community Directives:

Council Directive 2004/108/EC of 15 December 2004 on the approximation of the laws of Member States relating to electromagnetic compatibility.

and

Council Directive 2006/95/EC of 12 December 2006 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits:

and

Council Directive 1999/5/EC of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

International Modem Restrictions

Some dialing and answering defaults and restrictions may vary for international modems. Changing settings may cause a modem to become non-compliant with national telecom requirements in specific countries. Also note that some software packages may have features or lack restrictions that may cause the modem to become non-compliant.

New Zealand Telecom Warning Notice

1. The grant of a Telepermit for any item of terminal equipment indicates only that Telecom has accepted that the item complies with minimum conditions for connection to its network. It indicates no endorsement of the product by Telecom, nor does it provide any sort of warranty. Above all, it provides no assurance that any item will work correctly in all respects with another item of Telepermitted equipment of a different make or model, nor does it imply that any product is compatible with all of Telecom's network services.

This equipment is not capable under all operating conditions of correct operation at the higher speed which it is designated. 33.6 kbps and 56 kbps connections are likely to be restricted to lower bit rates when connected to some PSTN implementations. Telecom will accept no responsibility should difficulties arise in such circumstances.

2. Immediately disconnect this equipment should it become physically damaged, and arrange for its disposal or repair.
3. This modem shall not be used in any manner, which could constitute a nuisance to other Telecom customers.
4. This device is equipped with pulse dialing, while the Telecom standard is DTMF tone dialing. There is no guarantee that Telecom lines will always continue to support pulse dialing.

Use of pulse dialing, when this equipment is connected to the same line as other equipment, may give rise to 'bell tinkle' or noise and may also cause a false answer condition. Should such problems occur, the user should not contact the Telecom Faults Service.

The preferred method of dialing is to use DTMF tones, as this is faster than pulse (decadic) dialing and is readily available on almost all New Zealand telephone exchanges.

5. Warning Notice: No '111' or other calls can be made from this device during a mains power failure.
6. This equipment may not provide for the effective hand-over of a call to another device connected to the same line.
7. Some parameters required for compliance with Telecom's Telepermit requirements are dependent on the equipment (PC) associated with this device. The associated equipment shall be set to operate within the following limits for compliance with Telecom's Specifications:

For repeat calls to the same number:

- There shall be no more than 10 call attempts to the same number within any 30-minute period for any single manual call initiation, and
- The equipment shall go on-hook for a period of not less than 30 seconds between the end of one attempt and the beginning of the next attempt.

For automatic calls to different numbers:

- The equipment shall be set to ensure that automatic calls to different numbers are spaced such that there is no less than 5 seconds between the end of one call attempt and the beginning of another.

For automatically answered incoming calls:

- The equipment shall be set to ensure that calls are answered between 3 and 30 seconds of receipt of ringing.
8. For correct operation, total of the RN's of all devices connected to a single line at any time should not exceed 5.

Russian Statement

MT9234ZBA is Russia approved, Declaration of Conformity # Д-ТФ-0752 valid till 23.01.2018 (for MT9234ZBA).

South African Statement

This modem must be used in conjunction with an approved surge protection device.

Japan Requirements

This device conforms to (JATE) Japan Approval Institute for Telecommunications Equipment:

MT9234ZBA – JATE Approval A09-0125001



Thailand Approval

Translation:

“This telecom device and equipment is conform to technical standard no...”

or

“This telecom device and equipment is conform to requirement to NTC”

“เครื่องโทรศัพท์และอุปกรณ์นี้ มีความสอดคล้องตามมาตรฐานทางเทคนิค เลขที่...”

or

“เครื่องโทรศัพท์และอุปกรณ์นี้ มีความสอดคล้องตามข้อกำหนดของ กทช.”

Korea Class B Statement

Equipment (Residential Use)

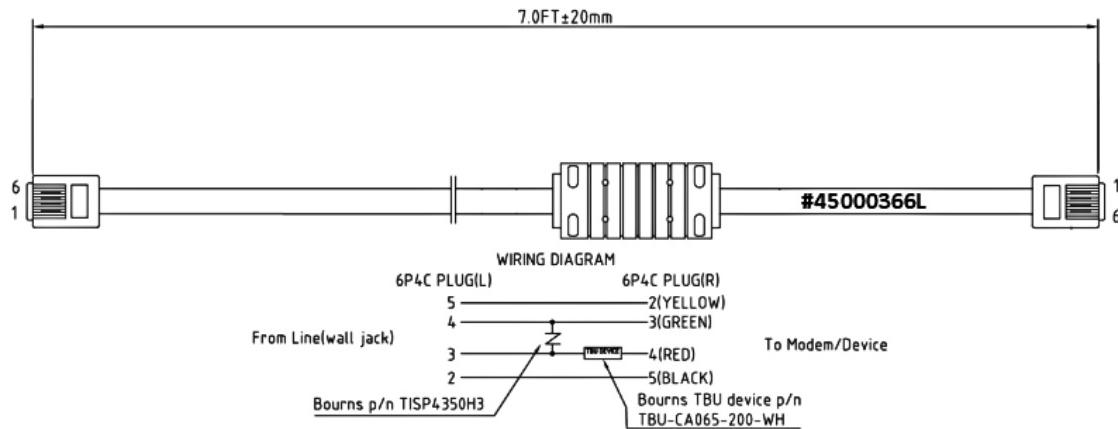
이 기기는 가정용(B급) 전자파적합기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

Brazil Special Cable – for MT9234ZBA model only

Attention:

A special phone cable is required for regulatory compliance.

Um cabo especial para telefone é requerido para a conformidade regulatória.



China Requirements

The following notice applies to modems sold in mainland China:

本标签只适用于中国大陆地区

仅适用于在海拔两千米及以下地区安全使用

仅适用于在非热带气候条件下安全使用

知用于热带地区请在空调机房中使用

Translation:

Only applicable in mainland China

Only use at altitude 2000M or lower area

Only use in non-tropical locations

Appendix C – Environmental Information

Waste Electrical and Electronic Equipment Statement

July, 2005

The WEEE Directive places an obligation on EU-based manufacturers, distributors, retailers, and importers to take-back electronics products at the end of their useful life. A sister directive, ROHS (Restriction of Hazardous Substances) complements the WEEE Directive by banning the presence of specific hazardous substances in the products at the design phase. The WEEE Directive covers all Multi-Tech products imported into the EU as of August 13, 2005. EU-based manufacturers, distributors, retailers and importers are obliged to finance the costs of recovery from municipal collection points, reuse, and recycling of specified percentages per the WEEE requirements.

Instructions for Disposal of WEEE by Users in the European Union

The symbol shown below is on the product or on its packaging, which indicates that this product must not be disposed of with other waste. Instead, it is the user's responsibility to dispose of their waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the seller from whom you purchased the product.



REACH Statement

Registration of Substances:

After careful review of the legislation and specifically the definition of an “article” as defined in EC Regulation 1907/2006, Title II, Chapter 1, Article 7.1(a)(b), it is our current view Multi-Tech Systems, Inc. products would be considered as “articles”. In light of the definition in § 7.1(b) which requires registration of an article only if it contains a regulated substance that “is intended to be released under normal or reasonable foreseeable conditions of use,” our analysis is that Multi-Tech Systems, Inc. products constitute nonregisterable articles for their intended and anticipated use.

Substances of Very High Concern (SVHC)

Per the candidate list of Substances of Very high Concern (SVHC) published October 28, 2008 we have reviewed these substances and certify the Multi-Tech Systems, Inc. products are compliant per the EU “REACH” requirements of less than 0.1% (w/w) for each substance. If new SVHC candidates are published by the European Chemicals Agency, and relevant substances have been confirmed, that exceeds greater than 0.1% (w/w), Multi-Tech Systems, Inc. will provide updated compliance status.

Multi-Tech Systems, Inc. also declares it has been duly diligent in ensuring that the products supplied are compliant through a formalized process which includes collection and validation of materials declarations and selective materials analysis where appropriate. This data is controlled as a part of a formal quality system and will be made available upon request.

Restriction of the Use of Hazardous Substances (RoHS)



Multi-Tech Systems, Inc.

Certificate of Compliance

2011/65/EU

Multi-Tech Systems confirms that its embedded products comply with the chemical concentration limitations set forth in the directive 2011/65/EU of the European Parliament (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment - RoHS)

These Multi-Tech products do not contain the following banned chemicals¹:

- Lead, [Pb] < 1000 PPM
- Mercury, [Hg] < 1000 PPM
- Hexavalent Chromium, [Cr+6] < 1000 PPM
- Cadmium, [Cd] < 100 PPM
- Polybrominated Biphenyl, [PBB] < 1000 PPM
- Polybrominated Diphenyl Ether, [PBDE] < 1000 PPM

Environmental considerations:

- Moisture Sensitivity Level (MSL) =1
- Maximum Soldering temperature = 260C (in SMT reflow oven)

¹Lead usage in some components is exempted by the following RoHS annex, therefore higher lead concentration would be found in some modules (>1000 PPM);

–Resistors containing lead in a glass or ceramic matrix compound.

Information on HS/TS Substances According to Chinese Standards

In accordance with China's Administrative Measures on the Control of Pollution Caused by Electronic Information Products (EIP) # 39, also known as China RoHS, the following information is provided regarding the names and concentration levels of Toxic Substances (TS) or Hazardous Substances (HS) which may be contained in Multi-Tech Systems Inc. products relative to the EIP standards set by China's Ministry of Information Industry (MII).

Name of the Component	Hazardous/Toxic Substance/Elements					
	Lead (PB)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr6+)	Polybrominated Biphenyl (PBB)	Polybrominated Diphenyl Ether (PBDE)
Printed Circuit Boards	O	O	O	O	O	O
Resistors	X	O	O	O	O	O
Capacitors	X	O	O	O	O	O
Ferrite Beads	O	O	O	O	O	O
Relays/Opticals	O	O	O	O	O	O
ICs	O	O	O	O	O	O
Diodes/ Transistors	O	O	O	O	O	O
Oscillators and Crystals	X	O	O	O	O	O
Regulator	O	O	O	O	O	O
Voltage Sensor	O	O	O	O	O	O
Transformer	O	O	O	O	O	O
Speaker	O	O	O	O	O	O
Connectors	O	O	O	O	O	O
LEDs	O	O	O	O	O	O
Screws, Nuts, and other Hardware	X	O	O	O	O	O
AC-DC Power Supplies	O	O	O	O	O	O
Software / Documentation CDs	O	O	O	O	O	O
Booklets and Paperwork	O	O	O	O	O	O
Chassis	O	O	O	O	O	O

X Represents that the concentration of such hazardous/toxic substance in all the units of homogeneous material of such component is higher than the SJ/Txxx-2006 Requirements for Concentration Limits.

O Represents that no such substances are used or that the concentration is within the aforementioned limits.

Information on HS/TS Substances According to Chinese Standards (in Chinese)

依照中国标准的有毒有害物质信息

根据中华人民共和国信息产业部 (MII) 制定的电子信息产品 (EIP) 标准—中华人民共和国《电子信息产品污染控制管理办法》(第 39 号)，也称作中国 RoHS，下表列出了 Multi-Tech Systems, Inc. 产品中可能含有的有毒物质 (TS) 或有害物质 (HS) 的名称及含量水平方面的信息。

成分名称	有害/有毒物质/元素					
	铅 (PB)	汞 (Hg)	镉 (Cd)	六价铬 (Cr6+)	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
印刷电路板	O	O	O	O	O	O
电阻器	X	O	O	O	O	O
电容器	X	O	O	O	O	O
铁氧体磁环	O	O	O	O	O	O
继电器/光学部件	O	O	O	O	O	O
IC	O	O	O	O	O	O
二极管/晶体管	O	O	O	O	O	O
振荡器和晶振	X	O	O	O	O	O
调节器	O	O	O	O	O	O
电压传感器	O	O	O	O	O	O
变压器	O	O	O	O	O	O
扬声器	O	O	O	O	O	O
连接器	O	O	O	O	O	O
LED	O	O	O	O	O	O
螺丝、螺母以及其他五金件	X	O	O	O	O	O
交流-直流电源	O	O	O	O	O	O
软件/文档 CD	O	O	O	O	O	O
手册和纸页	O	O	O	O	O	O
底盘	O	O	O	O	O	O

X 表示所有使用类似材料的设备中有害/有毒物质的含量水平高于 SJ/Txxx-2006 限量要求

O 表示不含该物质或者该物质的含量水平在上述限量要求之内。

Appendix D – Installing a Modem under Linux

This appendix explains how to install a modem on a computer operating under the Red Hat Linux 6.2 operating system. Other versions of Red Hat and other Linux operating systems should be similar. Briefly, in Linux, you do not need drivers for most standard external modems and most internal ISA bus modems. Programs in Linux commonly call upon the port, rather than the modem.

Standard Linux Serial Port Definitions

PC port	Linux port
Com1	ttyS0
Com2	ttyS1
Com3	ttyS2
Com4	ttyS3

Installation

Connect the external modem to an available serial port.

Setup

This section describes how to make sure Linux can talk to the modem and be able to dial up the Internet. Linux can use different programs and desktops depending on who made the Linux operating system and what version it is. The following procedures use the most commonly installed components of Red Hat 6.2. More information can be found in your Linux OS owner's manual.

Using the Terminal Program Minicom to Verify Operation

At the command prompt:

1. Type **minicom -s** and press Enter
2. Select **Serial port setup** and press Enter.
3. Use the **A** key to access Serial Device, and then press Enter.
4. Press **Esc**. You are now in the Minicom terminal.
5. Type **AT** and press Enter. The screen displays OK to verify the operation. Alternately, dial a phone number to verify line operation
6. To leave Minicom, press **Ctrl + A**, and then press **Z**.
7. On the help menu, press **X** to exit.

Using the Modem to Call the Internet

Linux allows different graphic user interfaces (GUI). In the following steps, we'll use the Gnome Desktop GUI and assume that your Internet Service Provider (ISP) assigns the Domain Name Service (DNS) and Internet Protocol (IP) addresses.

1. On the Task Bar at the bottom of the screen, select the Gnome Footprint.
2. Select **Internet** from the menu.
3. Select **Dialup Configuration Tool**.
4. Select **Add**, and then click **Next**.
5. Enter the connection name and phone number, and then click **Next**.
6. Enter your user name and password, and then click **Next**.
7. Select **Normal ISP** if your ISP is not listed, and then click **Next**.
8. Click **Finish**.

Calling the ISP

On the Task Bar at the bottom of the screen:

1. Select the Gnome Footprint.
2. Select **Internet** from the menu.
3. Select RH PPP Dialer.
4. Select the connection name you entered in step 5 of the previous section.
5. Click **OK**.

Answering Calls

To use the system for answering calls, Linux requires other programs to be installed, such as Mgetty, Mgetty+Sendfax, and others, depending on your requirements. Each vendor of Linux has more than adequate information on installing these programs.

Appendix E – Using Out of Band Management

This appendix describes how to set up routers. The router's console port, for example on a Cisco router, is an asynchronous serial port configured as data communications equipment (DCE).

Configuring the Modem for your Country or Region

Configure the modem defaults to match the requirements of the country/region in which it will be used. For information on how to do this, see “**Error! Reference source not found.**” in Chapter 2.

Configuring for Callback Security in Direct Connect Mode

Callback security requires a caller to give a correct password before sending data to the system. If you do not plan to use this feature, skip to Step 3.

Turning Direct Connect Callback Security On and Off

Callback security must be turned on to enter many callback security commands.

To turn on callback security:

1. Open a terminal program such as HyperTerminal.
2. Type the command **AT#Sxxxxxxxx**,

where **xxxxxxxx** is your password (1 to 8 characters long; case-sensitive).

3. Press Enter.

The modem responds with **OK** if the setup password is correct and **ERROR** if it is wrong. The default password is **MTSMODEM**. If you wish to change the password, then type the command **AT#S=xxxxxxxx**, where **xxxxxxxx** is the new password (1 to 8 characters long; case-sensitive), and press Enter.

4. Type one of the following commands:
 - To turn on remote callback security only, type **AT#CBS2** and press Enter.
 - To turn on both local and remote callback security, type **AT#CBS1** and press Enter. When local security is turned on, you must enter the setup password before you can enter any AT command from a local terminal except the AT, ATIn, and AT#Sxxxxxxxx commands.
5. To store the commands to nonvolatile memory, type **AT&W0**.

Setting the Parity of the Callback Security Messages

The modem’s password prompt and messages parity must match the parity of the computer to which the modem is connected.

1. The default parity setting for your modem is *no parity* (**AT#CBP0**). To change the modem’s prompt messages to use even parity, type **AT#CBP2** and press Enter. For odd parity, type **AT#CBP1** and press Enter.
2. To store the new parity value, type **AT&W** and press Enter.

Assigning Callback Passwords

To store a callback password for the first callback memory location:

1. Type **AT#CBN0=xxxxxxxx**

where xxxxxxxx is the first password.

The password must be unique, must be 6 to 10 characters in length and case-sensitive, and must not contain a + or - character.

2. Press Enter.

3. To store a callback password for the second callback memory location, type **AT#CBN1=xxxxxxxx**.

where xxxxxxxx is the second password.

4. Press Enter.

Note: The memory location number in the command is incremented by one.

5. Repeat as many times as necessary until all passwords have been entered.

6. To review your entries:

- a. Type **AT&V**

- b. Press Enter.

7. To set the modem for direct connect mode:

- a. Type **AT%H1**

- b. Press Enter.

Calling a Modem Configured for Callback Security

1. Using a terminal program and an originating modem, dial the number of the modem connected to the Cisco router, which we will call the “remote modem.”
2. When connection is established, the remote modem responds: *Password>*
3. Type a direct connection password, and press Enter. You have three attempts or one minute to enter a valid password.
4. If the password is valid, the message *OK Connecting* appears and the modems establish a working connection.

Console Port Final Setup

To complete setup:

- Send the following command string to the modem connected to the console port of the Cisco router:

AT%R1&W0

- The **%R1** command sets **E0, Q1, &D0, &K0, \$SB9600**, and **%S1**:

E0 Turns command echo off

Q1 Turns result codes off

&D0 Ignores DTR from the DTE

&K0 Selects no flow control

\$SB9600 Sets the serial baud rate to 9600 bps.

%S1 Disables command mode at all serial speeds except 115200 bps.

- The **&W0** command stores the commands to memory.

The modem is now configured for use on the Cisco router console port. Note that command echo and result codes have been turned off.

If you need to send additional AT commands to the modem after configuring it, the modem provides little feedback that it has received and acted upon the command. Only commands such as **ATIO** that request specific data from the modem send any data to the DTE as an indication that the modem has accepted the command.

Temporarily turning on command echo and result codes might make it easier to reconfigure the modem. When the modem is connected to the console port, turn the modem off and then on again. This will set the serial baud rate to 9600 bps as the **\$SB9600** command is implemented.

Console Port Connections

To connect a personal computer to the console port, use the RJ-45-to-RJ-45 roll-over cable and either the RJ-45-to-DB-25 female DTE adapter or the RJ-45-to-DB-9 female DTE adapter (labeled “TERMINAL”).

Cable Pin-outs and Cabling Guide

Console (DTE)	Console port	Console cable	Adapter	Adapter	Modem (DCE)
signal	RJ-45 pin	RJ-45 pin	DB-9 pin	DB-25 pin	signal
RTS	1	8	8	4	RTS
DTR	2	7	6	20	DTR
XMT	3	6	2	2	XMT
GND	4	5	5	7	GND
GND	5	4	5	7	GND
RCV	6	3	3	3	RCV
DSR	7	2	4	6	DSR
CTS	8	1	7	5	CTS

Remote Configuration

Configuring the modem results in core settings that allow the modem to function properly on the console port of the Cisco router.

You can use commands described in this section to remotely call into the MT9234ZBA attached to the console port with another modem.

Note: Setting country/region configuration and turning on callback security cannot be done remotely. Nor can all commands be executed remotely if the remote modem is set for callback security. Remote configuration of a modem configured this way is not recommended.

1. Establish a data connection with a remote MT9234ZBA modem.
2. Send three remote configuration escape characters followed by **AT** and the setup password, and then press Enter.

Example: **%%%ATMTSMODEM**. You have four tries to enter the correct password before being disconnected. If the password is correct, the remote modem may respond with **OK**.

Note: If the modem has previously been configured with command echo off and result codes off, it may be difficult to determine if the remote modem is responding to commands. The **ATI** command can be used for this purpose. Even with echo and result codes off, the modem will respond with the requested ID string if it is properly receiving the command.

3. You can now send AT commands to configure the remote modem.
4. When you have finished configuring the remote modem, save the new configuration by typing **AT&W0<CR>**, then type **A0<CR>** to exit remote configuration. You can then break the connection in the normal way.

Note: This step is important to ensure that the connection is broken cleanly.

Index

A	International Modem Restrictions.....	36
AT commands		
&W	17	
O 17, 18		
AT Commands.....	6	
Autoanswer.....	27	
C		
Call Waiting.....	27	
Callback Security.....	19	
Caller ID.....	28	
Change the Internal Jumpers.....	9	
Changing the Dial-Up/Leased-Line Jumper.....	10	
Changing the Voice Jumper	10	
China's Administrative Measures on the Control of Pollution	42	
Configure the Modem Using AT Commands	14	
Connecting the Modem to the PC	10	
D		
Dial-up Operation	10	
DTR (Data Terminal Ready) Control command.....	27	
E		
EMC Requirements		
United States.....	33	
European Community Directives	35	
F		
FCC	33	
Features Table	7	
Firmware		
Upgrading.....	30	
Flash Memory	30	
Flash Wizard Upgrade Utility	31	
Front Panel.....	15, 25	
G		
Garbage Characters	28	
I		
Indicators	15, 25	
Internal Jumpers	11	
J		
Jumpers	11	
L		
Leased Line Operation	10	
Leased-Line Operation.....	15	
LED Indicators.....	15, 25	
Line Connection	11	
Linux	44	
Lost Data.....	28	
M		
MNP 5 Data Compression.....	28	
N		
New Zealand Telecom Warning Notice	36	
P		
Protocols.....	28	
R		
REACH statement	40	
Remote Configuration	17	
Escape Character.....	18	
Result Codes	6	
RoHS Compliance.....	41	
RS-232 Connection	11	
S		
Serial Cable	26	
South African Statement	37	
Specifications, Technical.....	6	
S-Registers	6	
Static electricity	9	
T		
Technical Specifications.....	6	
Telephone		
Connection.....	11	
Testing the Modem		

Self-Test.....	25
Troubleshooting.....	25

U

Upgrading the Modem's Firmware.....	30
Using Out of Band Management	46

W

Waste Electrical and Electronic Equipment WEEE	
Statement	39
WEEE Directive	39